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CANADIAN GEOSCIENCE MAP 155

GEOLOGY

DIAMOND JENNESS PENINSULA

Victoria Island, Northwest Territories

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Cover Illustration

Cliff section near 11RAT-CB081 of upper Kilian Formation, Kuujjua Formation, Diabase sill and Natkusiak Formation, Victoria Island, Northwest Territories. Photograph by R.H. Rainbird July 11, 2005. 2013-310

ABSTRACT

NTS 87-H/3 is underlain by the middle to upper Kilian, Kuujjua and Natkusiak formations of the Neoproterozoic Shaler Supergroup. Together with ~3 diabase sills (type 2), spaced at regular intervals within the host sedimentary rocks, the strata comprise the gently south-dipping northern limb of the Holman Island Syncline. The northwest of the map area is dominated by a thick sill, which forms a prominent SE dip slope down to the Kuujjua River. Sedimentary strata are best exposed along a prominent cuesta that faces north-northwest along the south side of the Kuujjua River. The upper Kilian Formation and crossbedded quartzarenite of the disconformably overlying Kuujjua Formation are prominent along the cuesta's face together with conformably capping basalt flows of the Natkusiak Formation. Of note in this area, are quartz-arenite layers in basal lava flows of the Natkusiak, indicating that rivers which formed the Kuujjua sandstones continued to deposit detritus during volcanism.

RÉSUMÉ

Le feuillet SNRC 87-H/3 contient les roches des Formations de Kilian moyen à supérieur, Kuujjua et Natkusiak, appartenant tous au super-Groupe de Shaler d'âge néoprotérozoïque. Ceux-ci sont injectés par ~3 filons-couches de diabase (type 2), espacés à intervalles régulières. Les strates sont inclinées doucement vers le sud et constituent le flanc nord du Synclinal de Holman Island. La partie nord-ouest de la carte est dominée par un filon couche épais qui pend vers le sud-est au même angle que la topographie, jusqu'a la rivière Kuujjua. Un cuesta qui s'élève du côté sud de cette rivière expose les strates sédimentaires du Kilian supérieur et les lits entrecroisés des arénites à quartz du Kuujjua Formation, qui reposent en discordance sur les roches du Kilian. Au sommet de la falaise affleurent les coulées basaltiques du Natkusiak. Dans cette région, on remarque particulièrement l'interlitage des grès du Kuujjua et les basaltes du Natkusiak, indiquant que les rivières à l'origine du grès du Kuujjua existaient encore lors de l'initiation du volcanisme.

ABOUT THE MAP

General Information

Authors: R.H. Rainbird and J.H. Bédard

Geology by R.H. Rainbird and J.H. Bédard, 2010, 2011

Geomatics by É. Girard

Cartography by N. Côté

Initiative of the Geological Survey of Canada, conducted under the auspices of the Victoria Island PGE/Base Metals project, as part of Natural Resources Canada's Geo-mapping for Energy and Minerals (GEM) program.

Map projection Universal Transverse Mercator, zone 11.
North American Datum 1983

Base map at the scale of 1:50 000 from Natural Resources Canada, with modifications.
Elevations in metres above mean sea level

Shaded relief image derived from the digital elevation model supplied by GeoBase.
Illumination: azimuth 225º, altitude 45º, vertical factor 1x

Proximity to the North Magnetic Pole causes the magnetic compass to be erratic in this area. Magnetic declination 2014, 18º43'E, decreasing 52' annually.

The Geological Survey of Canada welcomes corrections or additional information from users.

Data may include additional observations not portrayed on this map.
See documentation accompanying the data.

This publication is available for free download through GEOSCAN (http://geoscan.ess.nrcan.gc.ca/).

Preliminary publications in this series have not been scientifically edited.

Map Viewing Files

The published map is distributed as a Portable Document File (PDF), and may contain a subset of the overall geological data for legibility reasons at the publication scale.

About the Geology

Descriptive Notes

The map area (NTS 87-H/3) lies within the Minto Inlier, a ~300 km long by 100–150 km wide belt of gently folded sedimentary and igneous rocks of early Neoproterozoic (late Tonian-early Cryogenian) age. The Neoproterozoic sedimentary strata belong to the Shaler Supergroup, an approximately 4 km thick succession of shallow marine carbonate rocks and evaporite rocks with interbedded terrigenous rocks that were mainly deposited in a shallow intracontinental epeiric sea, referred to as the Amundsen Basin (Rainbird et al., 1994; Rainbird et al., 1996a; Thorsteinsson and Tozer, 1962; Young, 1981). The basin is considered to have formed within the supercontinent Rodinia and exposures of similar rocks, in what are now the Mackenzie Mountains of the northern Cordillera, suggest that it extended for more than 1000 km to the southwest (Long et al., 2008; Rainbird et al., 1996a). The sedimentary succession is intercalated with mafic sills of the ca. 720 Ma Franklin igneous event (Heaman et al., 1992). The sills are of variable thickness up to 100 m, but most are 20–60 m thick. In many cases, individual sills extend for 20 km or more along-strike with little significant change in thickness. Sills constitute anywhere from 10 to 50 per cent of the stratigraphic section. Sills of similar type and age also occur in the Coppermine Homocline, Brock Inlier and Duke of York Inlier to the south (Rainbird et al., 1996b; Shellnutt et al., 2004) and coeval, geochemically similar intrusions and volcanic rocks associated with the Franklin event extend from Greenland to the western Yukon (Denyszyn et al., 2009; Heaman et al., 1992; Macdonald et al., 2010). The Shaler Supergroup in Minto Inlier is capped by a succession of flood basalt flows and interflow sedimentary rocks (Natkusiak Fm), more than 1 km thick, which are the extrusive equivalent of the sills (Baragar, 1976; Jefferson et al., 1985). Rare north-northwest-striking dykes are interpreted to have intruded along syn-magmatic normal faults, to feed sills and possibly the flood basalts (Bédard et al., 2012). Three magma populations are identified in the lavas, which have correlatives in the different sill subtypes. The oldest sills and corresponding basal lavas are enriched in incompatible trace elements and may have olivine-enriched bases. Younger diabasic sills correspond to the major sheet-flow units of the lava succession. Basal strata of the Shaler Supergroup (Rae Group) are exposed only at the northeastern end of Minto Inlier, near Hadley Bay, where they unconformably overlie Paleoproterozoic sedimentary rocks, which, in turn, unconformably overlie Archean granitic rocks (Campbell, 1981; Rainbird et al., 1994). The irregular edge of Minto Inlier is defined by an erosional unconformity that separates the Neoproterozoic rocks from lower Cambrian sandstone and siltstone that passes upward into a thick

succession of mainly dolomitic carbonate rocks, ranging in age from Cambrian to Devonian (Thorsteinsson and Tozer, 1962). Structurally, the Minto Inlier is relatively simple, composed of the open, northeast-trending Holman Island syncline and a smaller Walker Bay anticline to the northwest. Beds typically dip no more than 10° and there is generally no penetrative cleavage or other apparent outcrop-scale fabric. The origin of the folding is unknown but it occurred after deposition of the early Neoproterozoic rocks and before uplift, erosion and deposition of overlying lower Cambrian siliclastic rocks, which are not folded. All rocks are dissected by east-northeast to east-trending faults that form a horst and graben system with up to 200 of metres of stratigraphic separation on individual faults. The zone of faulting is about 100 km wide and stretches from the head of Minto Inlet in the west to Wynniatt Bay in the east and is spectacularly imaged as prominent lineaments on recently published aeromagnetic maps (e.g. Kiss and Oneschuk, 2010).

NTS 87-H/3 is underlain by stratigraphic units from the middle to upper Kilian Formation, Kuujjua Formation and Natkusiak Formation of the Shaler Supergroup. Together with diabase sills, the strata comprise the gently south-dipping northern limb of the Holman Island Syncline, whose axis lies under Quaternary cover along the southern edge of the map sheet. Exposures of the Kilian Formation are limited to the northwestern corner of the map sheet area (tan carbonate member), where it underlies a thick diabase sill that forms a prominent southeast dip slope down to the Kuujjua River. The upper Kilian Formation, Kuujjua Formation and basal Natkusiak Formation are best exposed along a prominent cuesta that faces north-northwest along the south side of the Kuujjua River. The Kilian generally is quite recessive but a good stratigraphic section that includes the tan carbonate member (nPK3) , upper evaporite member (nPK4) and entire Kuujjua Fm. (nPKj) is located at UTM 584746E, 7899309N (for details, see Rainbird, 1991; section 86-11). A good exposure of the Kuujjua Formation is located at UTM, 587842E, 7901748N, where a basaltic volcaniclastic unit similar to that described on the geological map of adjacent NTS87G/3 (CGM 104; Rainbird et al. 2013) forms its base. Another good section of the upper Kilian and Kuujjua formations is exposed to the south of an area of faulting, at UTM, 596987E, 7897382N. The Kuujjua Formation is much thinner here, indicating diminished accommodation space, which has been attributed to pre-eruptive thermal doming (Rainbird, 1993). The Natkusiak Formation generally is not well exposed on this map sheet, except along cliffs at the top of section 86-11. Of note in this area, is the presence of quartz-arenite lenses and layers separating basal lava flows of the lower member (nPN1), thus indicating that rivers which deposited the Kuujjua Formation sandstones continued to flow and deposit terrigenous detritus at the same time that eruptions were occurring. The lower recessive member (nPN2) is exposed only along the western edge of the map sheet and wedges out toward the northeast (Williamson et al., 2013). Approximately 3 diabase sills are exposed within the map area and are of the type 2 (diabasic) described in the legend.

Northeast-striking faults that displace the upper Kilian, Kuujjua and lower member (nPN1) of the Natkusiak Formation are evident at UTM, 596928E, 7902294N and UTM, 593750E, 7902850N. The fault at the first location appears not to have affected map unit nPN3, indicating that the faulting occurred during early stages of

eruption of the Natkusiak volcanic rocks. Northwest-striking faults, marked by prominent topographic lineaments but with limited offset, occur at two localities further to the west.

Holocene alluvial deposits and Late Wisconsinan proglacial and glacial deposits overlie much of the bedrock in this map area (see CGM 56; Hodgson, 2012).

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Author Contact

Questions, suggestions, and comments regarding the geological information contained in the data sets should be addressed to:

Rob Rainbird
Geological Survey of Canada
601 Booth Street
Ottawa ON
K1A 0E8
Rob.Rainbird@NRCan-RNCan.gc.ca

Coordinate System

Projection: Universal Transverse Mercator
Units: metres
Zone: 11
Horizontal Datum: NAD83
Vertical Datum: mean sea level

Bounding Coordinates

Western longitude: 115°00’00” W
Eastern longitude: 114°00’00” W
Northern latitude: 71°15’00” N
Southern latitude: 71°00’00” N

Data Model Information

This Canadian Geoscience Map does not conform to the Bedrock Mapping Geodatabase Data Model v.3.1.

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   ii upon written notice of termination by the Licensee at any time, and such termination shall take effect thirty (30) days after the receipt by Canada of such notice; or

   iii upon mutual agreement of the parties.

2. Upon the termination for whatever reason of this Agreement, the Licensee's obligations under section 4.0 shall survive; and the Licensee's rights under section 2.0 shall immediately cease.

3. Upon the termination for whatever reason of this Agreement, the Licensee shall delete or destroy all Data acquired under this Agreement immediately or within a reasonable timeframe where the Data is required to complete orders of Derivative Products made before the termination date of this Agreement.

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2. **Entire Agreement**

This Agreement constitutes the entire agreement between the parties with respect to its subject matter. This Agreement may only be amended in writing, signed by both parties, which expressly states the intention to amend this Agreement.

3. **Dispute Resolution**
   If a dispute arises concerning this Agreement, the parties shall attempt to resolve the matter by negotiation.

ACCORD DE LICENCE

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5. L'obligation du Détenteur de licence d'indemniser le Canada selon cet Accord ne peut affecter ni empêcher le Canada d'exercer tout autre droit selon la loi.

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1. Cet Accord entre en vigueur à partir de la date et de l'heure d'acceptation des modalités de l'Accord (Heure de l'Est) et restera en vigueur pour une période d'un (1) an, en vertu de la sous-section 5.2 et de la section 6.0 qui suivent.

2. À la fin du premier terme, cet Accord sera automatiquement renouvelé pour des termes successifs d'un (1) an, en vertu de la section 6.0 qui suit.

6.0 RÉSILIATION

1. 6.1 Nonobstant la section 5.0, cet Accord peut être résilié :

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   ii. par un préavis écrit de résiliation émis par le Détenteur de licence, en tout temps, et cette résiliation prendra effet trente (30) jours suivant la réception d'un tel préavis par le Canada; ou

   iii. par consentement mutuel des parties.

2. Lors de la résiliation de cet Accord, pour quelque raison que ce soit, les obligations qui incombent au Détenteur de licence en vertu de la section 4.0 continueront de s'appliquer et les droits du Détenteur de licence en vertu de la section 2.0 cesseront immédiatement.

3. Lors de la résiliation de cet Accord, pour quelque raison que ce soit, le Détenteur de licence devra immédiatement effacer ou détruire toutes les Données obtenues en vertu de cet Accord, ou à l'intérieur d'un délai raisonnable lorsque les Données sont nécessaires pour terminer la livraison de Produits dérivés commandés avant la résiliation de cet Accord.

7.0 GÉNÉRAL

1. **Lois d'application**
   Le présent Accord est régi et interprété en vertu des lois en vigueur dans la province de l'Ontario. Les parties acceptent de tomber sous la juridiction de la Cour supérieure de la Province de l'Ontario.

2. **Totalité de l'Accord**
   Le présent Accord constitue l'intégralité de l'entente conclue entre les parties relativement à l'objet du présent Accord. Toute modification à cet Accord ne peut être que par écrit, doit porter la signature de chaque partie et exprimer clairement l'intention de modifier cet Accord.

3. **Solution des litiges**
   Si un litige survient à propos de cet Accord, les parties tenteront de le résoudre par des négociations de bonne foi.